Synthetic Data with Digital Humans

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Trained with synthetic data only
Synthetic training data

Synthetic training data are labelled images made using computer graphics.

Why use synthetic data?

• Clean labels without annotation noise or error
• Generate labels impossible to annotate by hand
• Easy to control variation in dataset
Synthetic Training Data for Hand Tracking

Visible Light - RGB

Depth Camera

Ground Truth for Machine Learning
What makes good synthetic data

- Realism
- Diversity
- Richness of label
Realism

Why do we care? We want to avoid domain mismatch.
Diversity
Richness of label

With Synthetics, we can make labels which are impossible to label by hand.
How to make good synthetic data

Synthetics is procedural visual effects at scale.
Parametric 3D hand model

Generative model of shape and pose learned from 3D scans

Re-topologize and apply realistic textures

Sample hand appearance from texture library
Mocap pose database

24 camera capture studio
148,000 hand poses
97 hand shapes
Mocap pose database

Hand shapes and poses recovered with cloud-powered offline fitter.

300,000 data points / frame

Hand model fit to data
Digital Wardrobe
Synthetic > Real

With synthetics, you can solve tasks you never thought possible with real data.

- Per-pixel dense correspondence estimation.
- Regressing 453 keypoints simultaneously.
Synthetic Digital Humans

- Parametric human body model
  - Sample shape from statistical model
  - Sample pose from motion capture data

- Body with sampled shape and pose

- Photorealistic human with rich labels for machine learning
  - Apply realistic skin textures
  - Attach and simulate clothing
Synthetics is Visual Effects

Synthetic > Real